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ABSTRACT

Described are results of a preliminary investigation of the status of energy education activities within two-year postsecondary educational institutions. The specific areas investigated were coal technology, petroleum technology, nuclear technology, solar energy, energy conservation, and energy generation and transmission. Information was gathered by means of a telephone survey of 234 vocational-technical schools, technical institutes, trade schools, and home study schools located throughout the United States. Presented are data and explanatory descriptions of: (1) current energy-related vocational-technical programs, (2) planned programs, (3) existing short courses, (4) need for and funding of energy-related programs, and (5) interest in receiving further program information. (WB)

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Energy-Related Activities in Two-Year Postsecondary Vocational-Technical Institutions

A Representative Sampling by State

November 1978

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ABSTRACT

This data report describes the procedures and findings of a summer 1978 peer-to-peer telephone information exchange between the Education Programs Division of the Office of Education, Business and Labor Affairs, U.S. Department of Energy, and various vocational-technical schools throughout the United States. The report represents the first part, a preliminary investigation, of a comprehensive study to assess the state of the art of energy education activities within 2-year postsecondary educational institutions. The energy areas investigated were coal technology, petroleum technology, nuclear technology, solar energy, energy conservation, and energy generation and transmission.

The purpose of the peer-to-peer telephone information exchange was twofold: (1) to gather information about energy-related activities in 2-year postsecondary vocational-technical institutions, and (2) to disseminate relevant energy-related activities information and materials to those persons desiring such information. Selected schools from the *Directory of Postsecondary Schools with Occupational Programs, 1975-76* provided the universe of 723 institutions. Of these, 234 schools, a 32.4 percent sample, were contacted.

Twenty-one energy-related occupational-technical programs in 15 institutions in 12 states were located. Fourteen planned energy-related occupational-technical programs in 10 institutions in seven states were identified. One hundred seventeen short courses were being offered by 63 vocational-technical schools. Seventy institutions, 24 percent, reported receiving federal, state, local, and/or provate funding specifically for energy-related activities. One hundred forty-six respondents, 62 percent, believed that their institutions needed energy-related programs.

Respondents from 63 vocational institutions, 27 percent, requested and were sent energy-related occupational-technical program materials. All respondents were informed about the interests and activities of the Education Programs Division, U.S. Department of Energy.

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INTRODUCTION

The Education Programs Division (EPD), U.S. Department of Energy (DOE), contracted Manpower Research Programs, Oak Ridge Associated Universities, to assess the state of the art of energy education activities within 2-year postsecondary educational institutions. The project described herein, a peer-to-peer telephone information exchange, is intended as the first part of a comprehensive study. The major portion of the study, to be conducted in early 1979, is a survey of all 2- and 4-year institutions offering 1- and/or 2-year occupational programs in energy areas. The comprehensive study will be used by EPD in responding to inquiries from educational institutions, state and federal agencies, and legislative bodies and in developing its national plan to meet the future energy manpower and training requirements of the United States.

The current needs of EPD to answer specific questions and to disseminate specific information determined the design of this information exchange project. The Education Programs Division wished to assess existing energy technology education programs and short courses and to estimate energy technician manpower supply. The Division also felt it essential to determine the need for, as well as to provide, current information about energy-related occupational-technical programs to this vocational-technical school segment of 2-year postsecondary educational institutions in which few contacts had heretofore been made. A peer-to-peer telephone information exchange was used both to collect and disseminate information.

The information exchange was designed to meet five major objectives:

1. To determine number and type of energy-related occupational-technical programs currently being offered by a representative sample of postsecondary vocational-technical institutions.
2. To determine number and type of energy-related occupational-technical programs being planned by a representative sample of postsecondary vocational-technical institutions.
3. To assess public interest in energy-related occupational-technical areas by ascertaining which energy-related short courses have been offered in the past 2 years in a sample of postsecondary vocational-technical institutions.

4. To determine the expressed need and current funding for energy-related occupational-technical programs within the public and private sectors of a representative sample of postsecondary vocational-technical institutions.

5. To assess the need for information dissemination about energy-related occupational-technical programs among vocational-technical institution staffs and to create an awareness of the role of the Education Programs Division, Department of Energy, as a facilitator and catalyst in establishing a national energy education communications network among community colleges and vocational schools.

SECTION 1 - PROJECT DESIGN AND RESEARCH METHODOLOGY

The purpose of the peer-to-peer telephone information exchange was two-fold: (1) to gather information about energy-related activities in 2-year postsecondary vocational-technical institutions and (2) to disseminate relevant energy-related activities information and materials to those persons desiring such information. Three telephoners with backgrounds in education and social sciences were employed and trained. A telephone information-exchange system was developed. Telephoners were instructed about how to collect and disseminate information. They established communications with institutions about energy-related activities with the flow of information and ideas directed both toward and from the respective institutions.

This project was designed to interact with only vocational-technical schools in the United States. The *Directory of Postsecondary Schools with Occupational Programs, 1975-76*, compiled and published by the National Center for Education Statistics of the U.S. Office of Education, provided the universe of 2-year postsecondary vocational-technical institutions. The *Directory* lists institutions alphabetically by state and city, institutional data, and occupational program offerings. For this project community and junior colleges, 4-year colleges, and secondary schools listed in the *Directory* were deleted. Institutions with a low probability of operating energy-related programs and/or short courses were also systematically deleted: namely, occupational program categories of business/commercial schools, cosmetology/barber schools, flight schools, and hospital schools. Vocational-technical schools, technical institutes, trade schools, and home study schools were included. Of the 7507 entries in the *Directory*, only 723 vocational-technical schools in these latter categories comprised the universe for this telephone exchange. The schools selected were located throughout the United States, although three states--Delaware, North Dakota, and Vermont--had no vocational-technical schools remaining in the universe after completing the above deletions. Table 1 presents the universe of institutions.

The peer-to-peer telephone information exchange occurred in summer 1978. Correspondence and additional telephone calls requesting data clarification were conducted in September 1978.

State	Institutions with Occupational Programs, 1975-76[a]	Institutions Deleted To Create Vocational-Technical Institution Universe				Institutions with Low Probability of Offering Energy-Related Occupational-Technical Programs[b]	Selected Universe of Institutions
		Community and Junior Colleges	4-Year Colleges and Universities	Secondary Schools	Schools No Longer Operating		
Alabama	114	32	1	0	0	70	11
Alaska	17	5	1	0	0	9	2
Arizona	99	13	1	0	0	75	10
Arkansas	110	8	2	0	0	76	24
California	721	98	6	0	0	572	45
Colorado	111	15	4	0	0	78	14
Connecticut	129	16	2	0	0	98	13
Delaware	21	6	0	0	0	15	0
District of Columbia	33	0	1	0	0	26	6
Florida	218	27	0	0	0	160	31
Georgia	155	15	5	0	0	112	23
Hawaii	19	6	0	0	0	10	3
Idaho	42	3	3	0	0	30	6
Illinois	350	50	4	0	0	283	13
Indiana	167	13	8	0	2	138	6
Iowa	117	25	0	0	0	90	2
Kansas	112	19	1	0	0	77	15
Kentucky	111	9	9	0	0	77	16
Louisiana	145	4	7	0	0	97	37
Maine	60	8	1	2	0	47	2
Maryland	125	17	1	0	0	94	13
Massachusetts	195	30	2	0	0	148	15
Michigan	254	29	10	1	0	201	13
Minnesota	172	22	3	0	0	109	38
Mississippi	70	19	0	0	0	49	2
Missouri	208	14	7	3	0	151	33
Montana	48	3	0	0	0	39	6
Nebraska	86	9	3	0	0	73	1
Nevada	25	3	1	0	0	20	1
New Hampshire	44	8	1	0	0	34	1

State	Institutions with Occupational Programs, 1975-76[a]	Institutions Deleted To Create Vocational-Technical Institution Universe				Institutions with Low Probability of Offering Energy-Related Occupational-Technical Programs[b]	Selected Universe Of Institutions
		Community and Junior Colleges	4-Year Colleges and Universities	Secondary Schools	Schools No Longer Operating		
New Jersey	192	16	1	0	1	139	35
New Mexico	58	6	1	0	1	42	8
New York	418	55	5	0	1	344	13
North Carolina	178	61	0	0	0	114	3
North Dakota	52	5	2	0	1	44	0
Ohio	370	38	1	1	0	274	56
Oklahoma	168	16	4	0	0	111	37
Oregon	113	13	6	0	0	88	6
Pennsylvania	447	25	21	0	1	359	41
Rhode Island	34	2	3	0	0	27	2
South Carolina	100	23	0	0	0	71	6
South Dakota	44	2	2	0	0	35	5
Tennessee	203	13	1	0	1	150	38
Texas	432	51	4	0	1	349	27
Utah	52	5	6	0	0	37	4
Vermont	18	3	0	0	0	15	0
Virginia	137	22	2	1	0	104	8
Washington	183	28	1	0	0	143	11
West Virginia	81	9	5	0	0	51	16
Wisconsin	129	28	1	0	0	96	4
Wyoming	20	7	0	0	0	12	1
TOTALS	7507	954	150	8	9	5663	723

[a]National Center for Education Statistics, *Directory of Postsecondary Schools with Occupational Programs, 1975-76*, Washington, D. C., GPO, 1977.

[b]Categories of institutions excluded were business/commercial schools, cosmetology/barber schools, flight schools, hospital schools, and others.

Initially, the plan was to conduct a 25-percent random sampling of vocational-technical institutions within each state. However, to collect the maximum amount of energy-related program and short course information in the limited time available, telephoners were instructed to call "leads" given to them by respondents. As a result, 234 institutions, a 32-percent selective sample of the universe, were contacted. Table 2 lists by state the number of institutions contacted.

These 234 institutions constitute a representative sample of the universe. The sample includes 159 public instutitions (68 percent) and 75 private institutions (32 percent). Forty-four of the private institutions contacted (59 percent) were members of the National Association of Trade and Technical Schools. Appendix A provides a complete list by state of institutions contacted.

FORMS AND PROCEDURES

The Telephone Information Exchange Sheet (see Appendix B) was divided into four major parts: (1) information dissemination, (2) programs, (3) short courses, and (4) funding. Telephoners were instructed to contact the director of each institution. Before asking any questions, the telephoners explained who they were and why they were calling by relating a few details about the project. Occasionally, the call was transferred to another administrator or instructor. The initial question was, "Does your institution offer programs of 6 months, duration or more in coal technology, petroleum technology, nuclear technology, solar technology, wind power, energy generation and transmission, energy conservation, or other energy-related occupations?" When details about any existing program(s) were gathered, the telephoner then asked if that institution planned to offer in the near future new programs in the energy areas already cited. Each respondent was queried about whether or not he felt a need for energy-related programs in his respective geographical area. If respondents believed that their institutions should offer energy-related programs, they would often request information. Respondents wanted to know how they could develop a new curriculum. They also requested the names of contacts within institutions operating successful energy-related programs and within appropriate government agencies. Telephoners also asked respondents if their institutions had conducted any short courses in the above-mentioned energy areas. Telephoners sought information

Table 2. Sample by State of Vocational-Technical Postsecondary Institutions with High Probability of Offering Energy-Related Occupational-Technical Programs

State	Universe of Institutions	Institutions Contacted	
		Number	Percent
Alabama	11	3	27.3
Alaska	2	2	100.0
Arizona	10	3	30.0
Arkansas	24	8	33.3
California	45	12	26.7
Colorado	14	4	28.6
Connecticut	13	4	30.8
Delaware	0	0	0
District of Columbia	6	2	33.3
Florida	31	8	25.8
Georgia	23	7	30.4
Hawaii	3	1	33.3
Idaho	6	2	33.3
Illinois	13	5	38.5
Indiana	6	3	50.0
Iowa	2	1	50.0
Kansas	15	4	26.7
Kentucky	16	6	37.5
Louisiana	37	11	29.7
Maine	2	2	100.0
Maryland	13	4	30.8
Massachusetts	15	5	33.3
Michigan	13	6	46.2
Minnesota	38	10	26.3
Mississippi	2	1	50.0
Missouri	33	9	27.3
Montana	6	2	33.3
Nebraska	1	1	100.0
Nevada	1	1	100.0
New Hampshire	1	1	100.0
New Jersey	35	11	31.4
New Mexico	8	3	37.5
New York	13	5	38.5
North Carolina	3	1	33.3
North Dakota	0	0	0

Table 2. Sample by State of Vocational-Technical Postsecondary Institutions with High Probability of Offering Energy-Related Occupational-Technical Programs (Cont'd)

State	Universe of Institutions	Institutions Contacted	
		Number	Percent
Ohio	56	15	26.8
Oklahoma	37	11	29.7
Oregon	6	2	33.3
Pennsylvania	41	16	39.0
Rhode Island	2	1	50.0
South Carolina	6	3	50.0
South Dakota	5	2	40.0
Tennessee	38	10	26.3
Texas	27	8	29.6
Utah	4	2	50.0
Vermont	0	0	0
Virginia	8	3	37.5
Washington	11	3	27.3
West Virginia	16	8	50.0
Wisconsin	4	1	25.0
Wyoming	1	1	100.0
TOTALS	723	234	32.4

about the titles of the short-course offerings, the number and background of participants, the length of the course, and its purpose. Funding for both the energy-related programs and the short courses was discussed. In many cases, respondents sent information about their programs and short courses.

INFORMATION PRESENTATION

A Program Information Sheet was written for each *operating* energy-related occupational-technical program (see Appendix C). A copy of this sheet was mailed to each respondent for verification (see Appendix B). Additional information received by mail was incorporated into each Program Information Sheet. A synopsis of each *planned* energy-related occupational-technical program was written (see Appendix D).

Short courses as described were divided into energy areas. Within each energy area, short course title, occupation of participants in the course, school, and state were listed. Each short course was categorized as one of the following: upgrading, updating, increasing employability, increasing public knowledge, or meeting union agreements and/or federal regulations (see Appendix E).

INFORMATION DISSEMINATION

Information dissemination occurred both over the telephone and by correspondence. While calling, telephoners provided available information about energy-related occupational-technical program areas and numerous references for both program development and possible federal activities. In addition, over one-fourth of the respondents requested and were sent printed materials and/or information letters (see Appendix B). Materials most frequently mailed included *Activities of the Department of Energy in Energy Education*, solar-energy brochures obtained from the National Solar Heating and Cooling Information Center, and articles from *Energy and Education*, a DOE-funded bimonthly newsletter of the National Science Teachers Association.

SECTION 2 - PROJECT FINDINGS

Conversing with directors and other staff members of 2-year post-secondary vocational-technical schools throughout the country revealed that energy and energy-related programs are foremost topics of concern. "Energy" and "efficiency" often recurred as keywords in conversations. Many directors had contacted local industry officials, manpower planners, state officials, as well as their counterparts in other states to obtain information on energy-related manpower needs and to get ideas and input for establishing programs in emerging energy-related occupations. Several directors had sent instructors to energy-related conferences and had assigned staff members the tasks of developing specific programs. Respondents who did not currently have energy-related occupational-technical programs in their institutions volunteered information about energy-related topics being incorporated into the curricula of existing programs. Most frequently cited examples were new teaching units on solar installations and maintenance added to the heating, ventilation, and air conditioning curriculums; solar heating; energy conservation in household heating and cooling; and alternative energy sources incorporated into building trades programs.

Twenty-one energy-related occupational-technical programs located in 15 institutions in 12 states were being taught at the time of the study. Fourteen programs offered certificates upon completion, five presented diplomas, and two awarded associate degrees. The length of training time varied. The shortest program lasted for slightly less than 6 months. The longest required up to 3 years to complete. Training time for most programs ranged from 6 to 18 months.

Six energy areas were represented among the 21 operating programs: 9 programs in coal technology, 4 in nuclear technology, 3 in petroleum technology, 2 in energy generation and transmission, 2 in solar technology, and 1 in energy conservation (see Table 3). Program titles were generally descriptive of the program itself. Titles, however, could be misleading for categorizing programs in energy areas. The project staff collected curriculum materials to clarify program titles and to provide information about the training in each energy-related occupation. Program Information Sheets, including identifying information, program purposes, curricular topics, and statistics, were written (see Appendix C).

Table 3. Current Energy-Related Occupational-Technical Programs

State	School and Program(s)	Diploma, Degree, or Certificate	Program Began	Length of Program	Groups Trained	Graduates in Most Recent Group	Current Enrollment	Expected Graduates	Total Program Graduates
				Coal Technology					
Alabama	Walker County State Technical College Coal Mine Technology	Certificate	1975	15 months	3	34	≈ 160	50-60	45
Kentucky	Hazard State Vocational-Technical School Mining Maintenance Mechanic	Certificate	1963	18 months	15	≈ 20	45	≈ 20	300
West Virginia	Madisonville Area Vocational-Technical School Mine Equipment Maintenance and Operations	Diploma	1973	22 months (2640 hours)	_a	21	56	≈ 15	≈ 146
	Boone County Vocational School Mine Mechanics (CETA)	Certificate	1975	6 months	6	≈ 15	≈ 20	≈ 15	≈ 60-70
	Mining Technology	Certificate	1975	1-3 years	2	80	≈ 100	≈ 50	≈ 140
	Carver Career and Technical Education Center Mine Maintenance and Machine	Certificate	1975	6 months (1000 hours)	7	≈ 12	≈ 12	≈ 12	≈ 100
	Ralph R. Willis Vocational School Mine Maintenance	Certificate	1972	10 months (1200 hours)	6	≈ 20	≈ 30	≈ 20	132
	Mine Electricity	Certificate	1975	30 weeks (1200 hours)	10	25	0	0	250
	Mine Maintenance (CETA)	Certificate	1974	26 weeks (840 hours)	6	15-18	≈ 20	≈ 15	108
				Energy Conservation					
Minnesota	Red Wing Area Vocational-Technical Institute Energy Management and Conservation Technology	Diploma	1977	18 months (2184 hours)	1	_a	≈ 45	≈ 40	_a

Table 3. Current Energy-Related Occupational-Technical Programs (Cont'd)

State	School and Program(s)	Diploma, Degree, or Certificate	Program Began	Length of Program	Groups Trained	Graduates in Most Recent Group	Current Enrollment	Expected Graduates	Total Program Graduates
	Energy Generation and Transmission								
Ohio	West Side Institute of Technology								
	Environmental Technology	Associate Degree	1972	18 months	= 24	= 20	= 26	= 20	= 600
	Building Engineer	Certificate	1967	12 months (1210 hours)	= 40	= 20	= 26	= 20	= 1000
	Nuclear Technology								
District of Columbia	Capitol Radio Engineering Institute								
	Nuclear Engineering Technology	Diploma	1960	21 months (825 hours)	_b	_b	= 100	= 14	= 200
	Nuclear Instrumentation and Control	Diploma	1968	6 months (240 hours)	_b	_b	= 150	= 15	= 150
Idaho	Eastern Idaho Vocational Technical School								
	Radiation Safety	Certificate	1970	9 months	7	22	25	= 25	61
Massachusetts	Wentworth Institute and College of Technology								
	Nuclear Engineering Technology	Degree	1961	20 months	16	6	0	0	171
	Petroleum Technology								
Alaska	Seward Skills Center								
	Oil Utility Technician	Certificate	1977	6 months	2	28	= 30	= 25	48

Table 3. Current Energy-Related Occupational-Technical Programs (Cont'd)

State	School and Program(s)	Diploma, Degree, or Certificate	Program Began	Length of Program	Groups Trained	Graduates in Most Recent Group	Current Enrollment	Expected Graduates	Total Program Graduates
		Petroleum Technology (Cont'd)							
Kansas	Liberal Area Vocational-Technical School Industrial Electronics	Certificate	1968	11 months	[a]	≈ 20	≈ 30	≈ 20	[a]
Louisiana	Sowela Technical Institute Instrumentation Technology	Certificate	1976	24 months	1	19	36	15-20	19
		Solar Technology							
California	Harbor Occupational Center Solar Energy Worker	Certificate	1978	5 months (400 hours)	1	≈ 20	20	≈ 20	20
Minnesota	Red Wing Area Vocational-Technical Institute Air Conditioning, Heating, Refrigeration, and Related Solar Technology	Diploma	1973	18 months (2184 hours)	5	≈ 20	17	17	≈ 75-80

[a] Numbers unobtainable

[b] Participants not trained in groups

CURRENT PROGRAMS

Coal Technology

The nine identified programs in coal technology were found in six vocational-technical schools in West Virginia, Alabama, and Kentucky--all coal-producing states. Five of the schools established their coal programs between 1972 and 1975; the sixth began in 1963. All of the school respondents stated they had developed cooperation with local mining companies, and some respondents had endorsements from locals of the United Mine Workers of America. No vocational-technical school coal technology program was identified in the nine schools contacted in the western coal-producing states of Wyoming, Colorado, Utah, and Montana.

The types of coal mining programs varied. Three institutions offered coal mining skills for shaft mining to unemployed students. They received funding from the Comprehensive Education and Training Act (CETA). Three others offered students specialized training in mine equipment maintenance and mechanics. Two programs were designed to upgrade coal mine employees to pass certification requirements as electricians or mechanics.

The identified coal technology programs have graduated from 12 to 80 each year. One school in Kentucky and one in West Virginia operated open-entry/open-exit programs in which students move through at their own pace to receive certificates in specialty areas. Another program in Kentucky, operating since 1963, has successfully altered its program structure to meet needs and has produced over 300 graduates.

The three vocational-technical schools in West Virginia with coal technology programs exhibited a similarity not only in basic program structure but also in flexible program offerings essential to mining industry needs. The best example of flexibility in program offerings appeared in a Logan school whose mining electricity program was not currently operating because no local labor market demand existed. The mining electricity program will be ready to operate once again, however, when needed.

Another indication of the cooperative relationship between schools and local mining companies was found in the reported short courses. Nine vocational-technical schools in four states offered 25 short courses for miners One school in West Virginia offered six such courses--two to upgrade employed miners, two CETA-funded programs to increase participants' employability,

and two to meet union agreements and federal regulations. The Federal Mine Safety and Health Amendments Act of 1977 and the National Bituminous Coal Wage Agreement of 1978 mandate that miners receive yearly safety training as well as opportunities to improve mining skills. Schools with existing mining programs have been the logical source of such training throughout the coal-producing states.

Petroleum Technology

Three petroleum technology programs were located in Kansas, Louisiana, and Alaska--states in which crude oil is found. Each program seemed to have been established at a time of local demand for skilled personnel--1968 in Kansas, 1976 in Louisiana, and 1977 in Alaska. Two of the three programs offered highly-specialized training--one in industrial electronics and the other in instrumentation. They each produced approximately 20 graduates per year. The longevity of the Kansas program and its high rate of employed graudates demonstrated the success of meeting an industry need.

The oil utility technician program in Alaska was designed to provide students with 6 months of the theory and practical experience necessary to secure entry-level employment in any of a broad array of oil field jobs in rural Alaska. This program included such topics as oil exploration, chemical and physical properties of gas and oil, and equipment maintenance and operation. The Alaska program is being expanded from 6 to 8 months after initial experience demonstrated employers desired more training for their employees in some skill areas.

Nuclear Technology

Four distinctly different nuclear programs were identified. While it was difficult to extrapolate national trends from these, each one's involvement and approach toward skilled training in an energy-related area was significant.

A strong nuclear-related radiation safety program was identified within an Idaho vocational-technical school adjacent to the companies comprising the Idaho National Engineering Laboratories, a DOE contractor. The school designed its programs around the needs of the technicians. Since the school's beginning in 1970, 61 graduates have completed this program. Graduates not employed at nearby facilities frequently have found employment with other DOE

contractors. Successful nuclear programs identified in 1975 within community colleges have tended to develop similar associations with DOE contractors and public utilities. Program graduates have gained sufficient expertise to be easily assimilated as technicians by supporting or allied companies.

A nuclear engineering technology program located in a private vocational-technical institution in Massachusetts ended recently after having operated since 1961. Although local nuclear energy companies and utilities supported the program and frequently hired graduates at salaries in excess of $15,000, the program was unable to attract students. The institution could not afford financially to offer this expensive program with minimal class sizes, nor did it believe it could appropriately alter its admission requirements to accept students into the program who did not have strong science and mathematics backgrounds.

The third and fourth nuclear technology programs identified represent major electives in nuclear instrumentation and control and in nuclear engineering technology to a core electronics correspondence course. These home study programs, initiated in the 1960s, have had approximately 350 graduates. No record of graduate employment was available. These programs represent the only identified energy technology activities providing skills through correspondence courses.

Solar Energy

Two solar programs were discovered in the vocational-technical school sample. They typify two aspects of training development in the field: adding solar skills to existing technical programs and developing new solar energy programs. One solar program began in 1973 and provided solar skill modules to an existing 18-month program with the purpose of training workers to install and maintain solar energy collection systems as they apply to heating and cooling buildings. The other was developed in early 1978 in cooperation with a local utility company as a separate new solar energy worker program. It was designed to provide instruction in sizing, designing, and installing solar heating systems for residential and commerical buildings. Both programs graduated 20 solar technicians in their most recent groups. The older program has produced 75 to 80 graduates.

Energy Conservation and Energy Generation and Transmission

An energy conservation program from which no one has yet graduated was identified. This 18-month program began in 1977. School administrators hope that future graduates of this program will be able to aid in planning energy conservation techniques in new buildings and in providing retrofitting requirements for existing structures.

One Ohio institution offered two programs that dealt with energy-generation and transmission. These programs, among the oldest energy programs identified, began in 1967 and 1972, respectively. More than 1600 graduates have completed these programs. The building engineer program was developed primarily to help students obtain the engineering license required to operate power generation equipment. The associate degree program in environmental technology was designed to meet the requirements of working in the fields of steam power generation, commercial and residential air conditioning and heating, and pneumatic control. Based on the program description, this environmental technology program could also contain skills essential to working in energy conservation.

PLANNED PROGRAMS

Fourteen planned energy-related occupational-technical programs were located in the vocational-technical school sample. These were offered by 10 institutions in seven states. Only two of these institutions were also currently operating programs. Eight energy areas were represented among the 10 planned programs; six (43 percent) were in solar technology. The other energy areas were coal technology, energy conservation, energy generation and transmission, laser optics, wind power, petroleum technology, and energy management.

The telephone information exchange cannot be used to precisely extrapolate the number of vocational-technical institutions throughout the United States planning energy-related programs. However, because the survey identified 10 institutions with planned programs (32 percent of the selective sample of the universe), one might expect 20 additional schools in the 723-institution universe to be planning energy-related occupational-technical programs

Quantifying the information on programs being planned was difficult. The exact titles and curricula had not been decided by some schools. Some

programs were being planned informally with no projected start-up date having yet been decided. Six programs, however, were scheduled to begin in September 1978. Five tentatively will start in 1979. Telephoners did not request specific program plans, although several program outlines and brochures were received. Table 4 lists by energy area those institutions planning to offer energy-related programs. Appendix D summarizes each planned program and provides other identifying information.

A Minnesota institution has made a commitment to energy-related occupational career projects. It has established an Energy Education Center that currently offers two degrees in energy-related careers as well as seminars, workshops, teacher training, and adult education. The Center plans to offer three additional degree programs in 1979. Applied research is also planned. This institution will offer programs in some of the newer, nontraditional energy-related technologies such as wind power and alternative energy sources. Until its programs graduate entry-level technicians and until the short course offerings are evaluated, the success of this institution's efforts cannot be fully, nor fairly, determined.

SHORT COURSES

Of the 234 institutions contacted, 63 vocational-technical schools (27 percent) offered 117 energy-related short courses. Fifty-six of the schools (89 percent) were public institutions. A large majority of the 63 schools offered only one energy-related short course. Nine schools (14 percent) offered two or more courses. Of the 23 vocational-technical institutions identified in this report as currently offering or planning to offer energy-related occupational-technical programs, 14 (61 percent) are also offering energy-related short courses. For many schools, however, short courses represented their only energy-related activity.

Respondents were not always aware of which energy-related short courses were being taught at their institutions. They often referred the telephoner to night school directors. This situation exemplifies the difficulty of estimating energy activities from any one single source within an institution.

Identified short courses were reported in seven energy areas, even though some of the 117 courses were difficult to categorize by title alone. Short courses in energy conservation far outnumbered those in other energy areas. Yet they were concentrated in a small number of schools in only 21

Table 4. Planned Energy-Related Occupational-Technical Programs

Energy Area	State	Institution	Scheduled Beginning Date
Solar Technology	Arkansas	Delta Vocational-Technical School	1979-80 School Year
	Florida	Pinellas Vocational-Technical Institute	September 1978
	Minnesota	Dakota County Area Vocational-Technical Institute	Uncertain
	Minnesota	Red Wing Area Vocational-Technical Institute	September 1978
	New Jersey	Essex County Technical Career Center	September 1978
	Pennsylvania	Pennsylvania Institute of Technology	Spring 1979
Coal Technology	Tennessee	Jacksboro State Area Vocational-Technical School	Uncertain
	Pennsylvania	Pennsylvania Institute of Technology	Spring 1979
Petroleum Technology	Louisiana	Sowela Technical Institute	September 1978
Energy Conservation	Arkansas	Ouachita Vocational-Technical School	September 1978
Energy Generation and Transmission	Tennessee	Harriman State Area Vocational-Technical School	September 1978
Energy Management	Minnesota	Red Wing Area Vocational-Technical Institute	September 1979
Laser Optics	New Jersey	Essex County Technical Career Center	Uncertain
Wind Power	Minnesota	Red Wing Area Vocational-Technical Institute	September 1979

states. Forty-five energy conservation short courses, 38 percent of all short courses located, were found in 33 schools. A Kansas school offered nine energy conservation courses; six were designed for the general public. Three others were developed to update the skills of heating/boiler operators; heat pump specialists; and heating, ventilating, and air conditioning workers, respectively.

Coal technology represented the next largest short course group with 25 course offerings, 21 percent of the total located. These courses were found in nine institutions in four states. Six of the nine institutions had programs in coal technology. Their training expertise enabled them to develop quality courses for upgrading coal miners and to design adequate safety and certification classes to meet federal and union requirements.

Solar technology short courses numbered 22, 19 percent of the 117 short courses identified. These courses appeared in 18 institutions in 14 states and were equally divided between those courses categorized as updating and those designed to increase public knowledge.

Twenty-one short courses, 18 percent of the total, were in the energy generation and transmission area. These short courses were located at 10 institutions in five states. All except one short course was designed to upgrade employees and to enable them to obtain necessary licensing as boiler operators.

The energy areas of energy management, petroleum technology, and wind power were only nominally represented--one or two short courses each.

Energy-related short courses were offered for several reasons. Thirty-nine (33 percent) of the short courses were developed cooperatively by the institution and the local employer to update skills and/or information of current employees. Thirty-one were offered to increase public knowledge about energy. Twenty-nine were designed to upgrade the participant from a lower-level to a higher-level job. Eleven short courses were designed to meet union agreements and/or federal regulations. Seven short courses were developed for the sole purpose of increasing participants' employability. Table 5 presents by energy area the types of short courses offered.

Most short courses were presented in a few hours. Some, however, required 18 months of one evening each week for completion. Most short courses had been offered only once during the past 2 years, but a few had been repeated.

Table 5. Types of Short Courses Offered by Energy Area

Energy Area	Upgrading	Updating	Increasing Employability	Increasing Public Knowledge	Meeting Union Agreements and/or Federal Regulations	Totals	
						Number	Percent
Coal Technology	8	0	6	0	11	25	21
Energy Conservation	0	26	0	19	0	45	38
Energy Generation and Transmission	20	1	0	0	0	21	18
Energy Management	0	0	0	2	0	2	2
Petroleum Technology	1	0	0	0	0	1	1
Solar Technology	0	11	1	10	0	22	19
Wind Power	0	1	0	0	0	1	1
TOTALS	29	39	7	31	11	117	
Percent	25%	33%	6%	27%	9%		100

The number of short course participants ranged from 5 in "Energy Conservation for Business People" to 1650 in "Coal Safety Certification." Most classes included 10 to 20 participants. Appendix E presents by energy area the titles and types of short courses as well as the institution and state in which they were offered.

EXPRESSED NEED AND FUNDING

Each vocational-technical institution respondent was asked if there was a need for energy-related programs at his institution: 146 (62 percent) believed the need existed, 73 (31 percent) believed no need existed for energy-related programs in their institutions, and 15 (7 percent) were uncertain. The interested respondents were more than eager to learn what others in similar situations were doing to develop new programs. They wished to obtain relevant information, to conduct occupational surveys in their locale, and to develop programs to meet expressed needs if the funds were available. Their prevailing attitude during the telephone information exchange was best described in the words of the respondent who said, "No, we do not have any of those energy-related programs, but perhaps we should."

Information learned about attitudes, agreements, and working relationships of the vocational-technical schools was significant. One vocational-technical school was not offering an energy-related occupational-technical program because of a verbal agreement with a local junior college that was conducting such a program. Private institutions felt less need for energy-related programs than did public schools. Several respondents--from both public and private institutions--frankly stated they did not have the necessary funds to begin new technical programs. Approximately 10 percent of the respondents had attended conferences on specific energy areas, had developed curriculum outlines, had written program plans, and/or were awaiting funding to begin a new program.

Respondents were also asked about current funding for energy-related activities within their institutions. Seventy, of the 234 instututions contacted, reported receipt of federal, state, local, and/or private funding specifically for energy-related activities. Direct federal assistance had been acquired by 19 institutions. Thirty-three vocational-technical schools reported receiving funds from their respective states. Table 6 presents funding information by state for those institutions contacted. Note that

Table 6. Funding for Energy-Related Activities Received by 2-Year Postsecondary Vocational-Technical Institutions Contacted

State	Funds Received				No Funds Received	No Response
	Federal	State	Local	Private		
Alabama (3)*	1	1	-	1	-	2
Alaska (2)	-	1	-	-	1	-
Arizona (3)	1	-	-	-	2	-
Arkansas (8)	-	-	-	1	7	-
California (12)	-	1	-	-	10	1
Colorado (4)	-	-	-	-	3	1
Connecticut (4)	-	2	-	-	2	-
Delaware (0)	-	-	-	-	-	-
District of Columbia(2)	-	-	-	-	2	-
Florida (8)	1	1	-	-	6	-
Georgia (7)	-	2	-	-	4	1
Hawaii (1)	-	-	-	-	1	-
Idaho (2)	-	1	-	-	1	-
Illinois (5)*	-	-	1	1	4	-
Indiana (3)	-	-	-	-	3	-
Iowa (1)	-	-	-	-	1	-
Kansas (4)*	-	2	1	-	2	-
Kentucky (6)*	2	2	-	-	4	-
Louisiana (11)	-	1	-	-	9	1
Maine (2)	-	-	-	-	2	-
Maryland (4)	-	-	-	3	1	-
Massachusetts (5)	-	-	-	-	5	-
Michigan (6)*	-	1	2	-	4	-
Minnesota (10)	-	8	-	1	1	-
Mississippi (1)	-	-	-	-	1	-
Missouri (9)	-	-	-	-	9	-
Montana (2)	-	-	-	-	2	-
Nebraska (1)	-	-	-	-	1	-
Nevada (1)	-	-	-	-	1	-
New Hampshire (1)	-	-	-	-	1	-
New Jersey (11)*	1	3	4	-	4	-
New Mexico (3)	1	-	-	-	2	-
New York (5)	-	-	-	-	5	-
North Carolina (1)	-	1	-	-	-	-
North Dakota (0)	-	-	-	-	-	-

Table 6. Funding for Energy-Related Activities Received by 2-Year Postsecondary Vocational-Technical Institutions Contacted (Cont'd)

State	Funds Received				No Funds Received	No Response
	Federal	State	Local	Private		
Ohio (15)	2	-	-	-	13	-
Oklahoma (11)	-	-	-	-	11	-
Oregon (2)	-	-	-	-	2	-
Pennsylvania (16)*	2	-	-	1	14	-
Rhode Island (1)	-	-	-	-	1	-
South Carolina (3)	1	-	-	-	2	-
South Dakota (2)	-	1	-	-	1	-
Tennessee (10)*	3	4	1	-	7	-
Texas (8)	-	-	-	-	8	-
Utah (2)	-	-	-	-	2	-
Vermont (0)	-	-	-	-	-	-
Virginia (3)	-	-	-	-	3	-
Washington (3)	-	1	-	-	2	-
West Virginia (8)	4	-	1	-	1	2
Wisconsin (1)	-	-	-	-	1	-
Wyoming (1)	-	-	-	-	1	-
TOTALS (234)*	19	33	10	8	170	8
Percent			24%*		73%	3%

NOTE: Numbers in parentheses indicate the number of schools contacted.

*Some institutions received funds from more than one source.

institutions in eight states received more than one type of funding.

INFORMATION SHARING

Respondents from 64 vocational-technical institutions (27 percent) requested and were sent energy-related occupational-technical program materials. In addition, telephoners used information sheets containing listings and descriptions of various projects in several energy areas to relay relevant information by telephone. All respondents were informed about the interests and activities of the Education Programs Division, U.S. Department of Energy.

The telephone exchange provided an opportunity to test the feasibility of an "Energy Hotline." ORAU contacted the vocational-technical institutions and encouraged them to ask questions about energy-related activities, a process in reverse to normal hotline procedures. However, the interest in energy-related activities existed, as exemplified from the written responses sent to 27 percent of the contacts and the many other questions answered orally.

SECTION 3 - CONCLUSION

The peer-to-peer telephone information exchange established a communications network between 234 vocational-technical schools and the Education Programs Division, U.S. Department of Energy. It was evident that both public and private 2-year postsecondary vocational-technical institutions recognize that the American energy resources problem has created serious implications for their occupational education programs. Nevertheless, they also appear to realize that the grave energy situation presents expanded opportunities to diversify their program offerings to meet the realistic energy-related occupational needs of the American work force.

This project located 21 current energy-related occupational-technical programs, 14 planned programs, and 117 short courses in nine energy-related areas: coal technology, energy conservation, energy generation and transmission, energy management, laser optics, nuclear technology, petroleum technology, solar technology, and wind power.

Sixteen (76 percent) of the current energy-related occupational-technical programs were identified in the primary energy technologies of coal, nuclear, and petroleum. These programs are a mixture of courses stressing broad technical knowledge and courses presenting highly-specialized technology. Some programs are aimed at entry-level job skills while others are employee-upgrading programs. Each institution has worked with the industry involved to design the curriculum necessary to meet that industry's skill demands. As early as 1963, highly successful programs were developed cooperatively with local industries to meet local job market demands. Coal and petroleum extraction technology programs have existed for more than 20 years and no doubt will expand only in states where extraction is increasing rapidly. Alaska's new petroleum technology program and West Virginia's mid-1970s upsurge of new coal programs exemplify this trend.

Five additional current programs are in the energy areas of energy conservation, solar technology, and energy generation and transmission. The two programs in energy generation and transmission have been operating for 6 and 11 years, respectively. The placement and evaluation of their more than 1600 graduates and the longevity of these programs have established their success. The newly established programs in energy conservation and solar technology, however, lack adequate criteria for ascertaining their quality and success. They have been operating for 1 year or less.

Sixty-two percent of the respondents believe that energy-related programs are needed at their institutions. Their questions evidenced the fact that they wish to become more knowledgeable about necessary skills and careers in energy-related technologies. The respondents often lack essential information and knowledge with which to make decisions concerning the design and development of new energy-related occupational-technical programs within their institutions.

Although the telephone information exchange focused on existing energy-related programs, the identification of 14 planned programs and 117 short courses is significant. Six (43 percent) of the planned programs are in solar technology. The remaining eight planned programs involve seven areas: coal technology, petroleum technology, energy conservation, energy generation and transmission, energy management, laser optics, and wind power. Short courses were located in all energy areas except nuclear technology. Most short courses were developed cooperatively with local industries, just as were the existing energy-related occupational-technical programs. Short courses in energy conservation represent 38 percent of all those located, whereas those in coal technology represent 21 percent of the total. Short courses are offered for five main reasons--upgrading, updating, increasing employability, increasing public knowledge, and meeting union agreements and/or federal regulations. Fifty-eight percent of the identified short courses are offered for upgrading and updating purposes, whereas 27 percent are courses to increase public knowledge about a particular aspect of energy.

A Minnesota institution has been heavily involved in the field of energy-related occupations. It currently offers two programs and four short courses in the four energy areas of energy conservation, energy management, solar technology, and wind power, and it has three programs in the planning stage. Also identified, but not reported, in this study were traditional programs in building trades and heating, ventilation, and air conditioning that had inserted solar components and conservation elements into their curricula.

The results of the peer-to-peer telephone information exchange represent a 25-percent state sample and a 32.4-percent national sample of 2-year postsecondary vocational-technical schools. The exchange demonstrates that 2-year postsecondary educational institutions probably are not as heavily involved in the new energy technology programs as the community colleges

surveyed in 1975. Combined with data from this report, a survey of the energy-related activities in community and junior colleges (to be conducted in January 1979) will provide much needed current data and information about energy-related technician-level occupational programs in all 2-year postsecondary educational institutions throughout the country.

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APPENDIX A - LIST OF INSTITUTIONS CONTACTED

State	Institution	Control/ Affiliation
Alabama	MacArthur Technical College	Public
	Muscle Shoals Technical Institute	Public
	Walker County State Technical College	Public
Alaska	Alaska Skill Center at Seward	Public
	North Star-Boro Vocational-Technical School	Public
Arizona	Maricopa County Skill Center	Public
	Refrigeration School	Proprietary[1]
	Universal Technical Institute	Proprietary[1]
Arkansas	Arkansas Valley Vocational-Technical School	Public
	Cotton Boll Vocational-Technical School	Public
	Delta Vocational-Technical School	Public
	Oil Belt Vocational-Technical School	Public
	Ouachita Vocational-Technical School	Public
	Petit Jean Vocational-Technical School	Public
	Pines Vocational-Technical School	Public
	United Electronics School	Proprietary[1]
California	Central City Occupational Center	Public
	Engineering Drafting School	Proprietary
	Garden Grove Adult Education	Public
	Harbor Occupational Center	Public
	Modern Trade Institute	Proprietary[1]
	National Career Institute	Proprietary[1]
	National Technical School	Proprietary[1]
	North Valley Occupational Center	Public
	Petaluma Adult School	Public
	Polytechnical Institute	Proprietary
	Skills and Business Education Center	Public
	Valley Vocational School	Public
Colorado	Aurora Technical Center	Public
	Boulder Valley Area Vocational-Technical Center	Public
	Larimer County Vocational-Technical Center	Public
	San Juan Basin Area Vocational School	Public
Connecticut	Connecticut School of Electronics	Proprietary[1]
	Goodwin Regional Vocational-Technical School	Public
	Norwich Regional Vocational-Technical School	Public
	Prince Regional Vocational-Technical School	Public
District of Columbia	Armstrong Adult Education Center	Public
	Capitol Radio Engineering Institute	Proprietary
Florida	Bradford Area Vocational-Technical Center	Public
	Lee County Vocational-Technical Center	Public

State	Institution	Control/ Affiliation
Florida (Cont'd)	Manatee Vocational-Technical Center	Public
	Pinellas Vocational-Technical Institute	Public
	Polk Vocational-Technical Center	Public
	Sheridan Vocational Center	Public
	Suwanee-Hamilton Area Vocational-Technical Adult Center	Public
	Tampa Technical Institute	Propreitary[1]
Georgia	Albany Area Vocational-Technical School	Public
	Athens Area Vocational-Technical School	Public
	Columbus Area Vocational-Technical School	Public
	Macon Area Vocational-Technical School	Public
	Savannah Area Vocational-Technical School	Public
	Thomas County Area Vocational-Technical School	Public
	Walker County Area Vocational-Technical School	Public
Hawaii	New York Technical Institute	Proprietary
Idaho	Boise Area Vocational-Technical School	Public
	Eastern Idaho Vocational-Technical School	Public
Illinois	Cairo Egyptian Adult Center	Public
	Chicago Technical College	Independent
	Greer Technical Institute	Proprietary[1]
	Morrison Institute of Technology	Independent
	Washburne Trade School	Public
Indiana	ITT Technical Institute	Proprietary[1]
	Lincoln Technical Institute	Proprietary[1]
	Valparaiso Technical Institute	Proprietary
Iowa	Academy of Radio and T.V.	Proprietary[1]
Kansas	KAW Area Vocational-Technical School	Public
	Liberal Area Vocational-Technical School	Public
	Southwest Kansas Area Vocational-Technical School	Public
	Wichita Area Vocational-Technical School	Public
Kentucky	Ashland State Vocational-Technical School	Public
	Bowling Green State Vocational-Technical School	Public
	Daviess County Area Vocational School	Public
	Hazard State Vocational-Technical School	Public
	Madisonville Area Vocational-Technical School	Public
	Northern Kentucky State Vocational-Technical School	Public

State	Institution	Control/ Affiliation
Louisiana	Baton Rouge Vocational-Technical School	Public
	Delta-Ouachita Vocational-Technical Institute	Public
	Gulf Area Vocational-Technical School	Public
	Natchitoches Trade School	Public
	Orleans Area Vocational-Technical School	Public
	Sabine Valley Vocational-Technical School	Public
	Shreveport-Bossier Vocational-Technical Center	Public
	Sowela Technical Institute	Public
	T. H. Harris Vocational-Technical School	Public
	Teche Area Vocational-Technical School	Public
	Young Memorial Vocational-Technical School	Public
Maine	Andover Institute	Proprietary
	Sanford Regional Technical-Vocational Center	Public
Maryland	Educators Instructional Services	Proprietary
	Maryland School for Business Education and Vocational Skills	Proprietary
	RETS Electronic School	Proprietary[1]
	TESST Electronics School	Proprietary[1]
Massachusetts	Associated Technical School	Proprietary[1]
	Northeast Institute of Industrial Technology	Independent[1]
	Quincy Vocational-Technical School	Public
	Wentworth Institute	Independent
	Worcester Industrial Technical Institute	Public
Michigan	Allied Careers Institute	Proprietary[1]
	Branch Area Careers Center	Public
	Genessee Area Skill Center	Public
	Kent Beltline Skills Center	Public
	Michigan Career Institute	Proprietary[1]
	Southeast Oakland Vocational Education Center	Public
Minnesota	Alexandria Area Vocational-Technical Institution	Public
	Dakota County	Public
	Dunwoody Industrial Institution	Independent
	Moorehead Area Vocational-Technical Institute	Public
	916 Area Vocational-Technical Institute	Public
	Red Wing Area Vocational-Technical Institute	Public
	Rochester Area Vocational-Technical Institute	Public
	St. Paul Area Vocational-Technical Institute	Public
	Staples Area Vocational-Technical Institute	Public
	Suburban Hennepin Area Vocational Institute	Public
Mississippi	Phillips College	Proprietary[1]

State	Institution	Control/ Affiliation
Missouri	Basic Institute of Technology	Proprietary[1]
	Columbia Area Vocational School	Public
	Franklin Technical School	Public
	Graff Area Vocational-Technical School	Public
	Linn Technical College	Public
	Ranken Technical Institute	Independent[1]
	Rolla Area Vocational-Technical School	Public
	Tri-County Technical School	Public
	Waynesville Area Vocational-Technical School	Public
Montana	Helena Vocational-Technical Center	Public
	Missoula Vocational-Technical Center	Public
Nebraska	Universal Technical Institute	Proprietary[1]
Nevada	Education Dynamics Institute	Proprietary[1]
New Hampshire	Hesser College	Proprietary
New Jersey	Burlington County Vocational-Technical School	Public
	Cumberland County Area Vocational-Technical School	Public
	Essex County Technical Career Center	Public
	Lincoln Technical Institute	Proprietary[1]
	Mercer Manpower Training Skills Center	Public
	Morris County Area Vocational-Technical School	Public
	Ocean County Vocational-Technical School	Public
	Passaic County Area Vocational-Technical School	Public
	Salem County Vocational-Technical School	Public
	Sussex County Vocational-Technical School	Public
	Union County Technical Institute	Public
New Mexico	Albuquerque Technical-Vocational Institute	Public
	Northern New Mexico Vocational-Technical Institute	Public
	Southwestern Indian Polytechnic Institute	Public
New York	Berk Trade School	Proprietary[1]
	BOCES Adult Education Center	Public
	Roberts Technical and Trade Schools	Proprietary
	SCS Business and Technical Institute	Proprietary
	Vocational Education and Extension Board	Public
North Carolina	Technical Institute of Alamance	Public
Ohio	ATES Technical Institute	Independent[1]
	Auburn Career Center	Public
	Canton Manpower Training Center	Public

State	Institution	Control/ Affiliation
Ohio (Cont'd)	Greene Vocational School	Public
	Industrial Timestudy Institute	Proprietary
	ITT Technical Institute	Proprietary
	Lorain County Joint Vocational School	Public
	McKim Technical Institute	Proprietary
	New York Technical Institute	Proprietary
	NHAW Home Study Institute	Proprietary
	Ohio Institute of Technology	Proprietary[1]
	RETS Technical Center Incorporated	Proprietary[1]
	Southern Ohio Manpower Training Center	Public
	Youngstown Manpower Skills Center	Public
	West Side Institute of Technology	Proprietary[1]
Oklahoma	Caddo-Kiowa Area Vocational-Technical School	Public
	Great Plains Area Vocational-Technical School	Public
	Indian Capitol Area Vocational-Technical School	Public
	Kiamichi Area Vocational-Technical School	Public
	Mid-America Area Vocational-Technical School	Public
	Moore Norman Area Vocational-Technical School	Public
	Northeast Oklahoma Area Vocational-Technical School	Public
	Oklahoma City Area Vocational-Technical School (Now is Foster Estes Vocational-Technical School)	Public
	Southern Oklahoma Area Vocational-Technical School	Public
	Tri-County Area Vocational-Technical School	Public
	Western Oklahoma Area Vocational-Technical School	Public
Oregon	Technical Training Service	Proprietary
	West Coast Training Service	Proprietary
Pennsylvania	ATES Technical School	Proprietary
	Carbon County Area Vocational-Technical School	Public
	Central Montgomery County Area Vocational-Technical School	Public
	Dean Institute of Technology	Proprietary[1]
	Jefferson County Dubois Area Vocational-Technical School	Public
	Lincoln Technical Institute	Proprietary[1]
	New Castle School of Trades	Proprietary[1]
	Northumberland County Area Technical School	Public
	Opportunities Industrialization Center	Independent
	Pennsylvania Institution of Technology	Proprietary[1]
	Philadelphia Wireless Technical Institute	Independent

State	Institution	Control/ Affiliation
Pennsylvania (Cont'd)	Technician Training School	Independent[1]
	Thaddeus Stevens Trade School	Public
	Triangle Institute of Technology	Proprietary[1]
	Upper Bucks County Area Vocational-Technical School	Public
	Washington Institute of Technology	Proprietary[1]
Rhode Island	New England Technical Institute	Independent[1]
South Carolina	Kershaw County Vocational Center	Public
	Nielson Electronics Institute	Proprietary[1]
	R. D. Anderson Vocational Center	Public
South Dakota	Lake Area Institute of Technology	Public
	Mitchell Area Vocational-Technical School	Public
Tennessee	Athens State Area Vocational-Technical School	Public
	Chattanooga State Area Vocational-Technical School	Public
	Dickson State Area Vocational-Technical School	Public
	Harriman State Area Vocational-Technical School	Public
	Jacksboro State Area Vocational-Technical School	Public
	Jackson State Area Vocational-Technical School	Public
	Memphis State Area Vocational-Technical School	Public
	Oneida State Area Vocational-Technical School	Public
	Tennessee Institute of Electronics	Proprietary[1]
	William Moore School of Technology	Proprietary
Texas	Adult Education Center	Public
	Capitol City Trade and Technical School	Proprietary[1]
	Durham Business College	Proprietary[1]
	El Paso Trade School	Proprietary
	Elkins Institute	Proprietary
	Houston Community College Systems Skills Center	Public
	San Antonio Trade School	Proprietary
	Texas Vocational School	Proprietary
Utah	Bridgerland Area Vocational Center	Public
	Sevier Valley Technical Center	Public
Virginia	Columbia Technical Institute	Proprietary
	Control Data Institute	Proprietary[1]
	Steeles Welding School	Proprietary
Washington	Bates Vocational-Technical Institute	Public
	Renton Vocational-Technical Institute	Public
	Washington Technical Institute	Proprietary[1]

States	Institution	Control/ Affiliation
West Virginia	Benjamin Franklin Career and Technical Education Center	Public
	Boone County Vocational School	Public
	Carver Career and Technical Education Center	Public
	Logan County Vocational-Technical Center (Now is Ralph R. Willis Vocational School)	Public
	McKinley Vocational-Technical School	Public
	Mineral County Vocational-Technical Center	Public
	Monongalia County Vocational Center	Public
	Vivian Mining Campus	Public
Wisconsin	Herzing Institute	Propreitary
Wyoming	Wyoming Technical Institute	Proprietary[1]

[1]National Association of Trade and Technical School.

APPENDIX B - MATERIALS FOR CONDUCTING SURVEY

INFORMATION SENT _____

TELEPHONE INFORMATION EXCHANGE SHEET
FOR
ENERGY-RELATED ACTIVITIES IN TWO-YEAR POSTSECONDARY VOCATIONAL-TECHNICAL INSTITUTIONS

INSTITUTION: _____ ☐ State

CONTACT NAME: _____

TITLE: _____

ADDRESS: _____

_____

TELEPHONE: _____

PROGRAMS

PRESENT ENERGY PROGRAMS OF AT LEAST 6-MONTHS DURATION:
☐ Coal Technology ☐ Petroleum Technology ☐ Nuclear Technology ☐ Solar Technology ☐ Wind Power ☐ Energy Management ☐ Energy Conservation
☐ Energy Generation and Transmission

Other(s) (Name.) _____

PROGRAM INFORMATION:

☐	☐	☐
Date Began _____	Date Began _____	Date Began _____
Degree/Certificate _____	Degree/Certificate _____	Degree/Certificate _____
Length in Months _____	Length in Months _____	Length in Months _____
Present Enrollment _____	Present Enrollment _____	Present Enrollment _____
Graduates (FY1978) _____	Graduates (FY1978) _____	Graduates (FY1978) _____
Expected Grads (FY1979) ____	Expected Grads (FY1979) ____	Expected Grads (FY1979) ____
Curriculum Details: _____	Curriculum Details _____	Curriculum Details _____

PLANNED ENERGY PROGRAMS OF AT LEAST 6-MONTHS DURATION:
☐ CT ☐ PT ☐ NT ☐ ST ☐ WP ☐ EMP ☐ EC ☐ EGT

Other(s) (Name.) _____

PROGRAM INFORMATION:

Stage of Dev. _____	Stage if Dev. _____	Stage of Dev. _____
Date to Begin _____	Date to Begin _____	Date to Begin _____
Degree/Certificate _____	Degree/Certificate _____	Degree/Certificate _____
Length in Months _____	Length in Months _____	Length in Months _____
Expected Enrollment _____	Expected Enrollment _____	Expected Enrollment _____
Expected Grads (FY1979) ____	Expected Grads (FY1979) ____	Expected Grads (FY1979) ____
Job Needs Survey Done _____ (If yes, send info.)	Job Needs Survey Done _____ (If yes, send info.)	Job Needs Survey Done _____ (If yes, send info.)
Curriculum Details:	Curriculum Details:	Curriculum Details:

DO YOU FEEL THERE IS NEED FOR ENERGY-RELATED PROGRAMS AT YOUR INSTITUTION? _____

ORAU CONTACT _____ / _____ / Date

TELEPHONE INFORMATION EXCHANGE SHEET (SIDE TWO)

INSTITUTION: _____ _____
State

CONTACT NAME: _____

SHORT COURSES: PARTICIPANTS AND UPGRADING

HAS YOUR INSTITUTION OFFERED, OR SPONSORED, ENERGY-RELATED SHORT COURSES DURING FY77 AND FY78 FOR THE FOLLOWING GROUPS?

	Number of Short Courses Offered	Approximate Number of People Served
Civic Groups		
Home Owners		
Small Business Owners		
Builders and/or Construction Workers		
Architects		
Carpenters		
Electricians		
HV/AC Workers		
Plumbers		
Welder Certification		
Coal Miners		
Engineers		
Government Officials		
Teachers		
Utilities Operating Personnel		
Others _____ (Specify)		

HAS YOUR INSTITUTION OFFERED INSTRUCTION SPECIFICALLY TO UPGRADE EMPLOYED PERSONS IN THESE ENERGY-RELATED AREAS?

Coal Mining		
Energy Conservation		
Electrical Genration & Trans.		
Geothermal		
Nuclear		
Petroleum		
Solar		
Wind Power		
Other _____ (Specify)		

FUNDING

HAS YOUR INSTITUTION RECEIVED FEDERAL, STATE, LOCAL, OR PRIVATE ASSISTANCE WITHIN THE LAST TWO FISCAL YEARS FOR CONDUCTING ENERGY-RELATED ACTIVITIES? _____

Sources of funds _____

Do you feel need of additional funding in energy-related areas? _____

From what sources? _____

ORAU CONTACT _____ _____
Date

Letter to Respondents Whose Institutions Offer Energy-Related Occupational-Technical Programs

Oak Ridge Associated Universities

Post Office Box 117
Oak Ridge, Tennessee 37830
Telephone 615 483-8411

Manpower Education, Research and Training Division

Dear

This summer your respond to our telephone information exchange concerning energy-related activities in two-year postsecondary vocational-technical institutions. As you recall, we are conducting this project for the Education Programs Division of the U.S. Department of Energy. Presently we are writing the final report. Since your institution offers an energy-related program, we have enclosed your Program INformation Sheet for you to look over carefully to make any necessary corrections and/or additions.

Although the format of this information sheet is generally self-explanatory, you may need some explanation of terminology. "Number of Groups Trained" asks how many times your institution has offered this program (including your present group). "Number of Graduates of Most Recent Group" asks how many students completed the program in the last (not the present) group. "Total Program Graduates" requests the total number of graduates of your program in all the groups trained. When the exact number is not known, we use "c." to represent circa, meaning approximately.

We must complete our report this month and we would appreciate your response by September 15. Your institution's information is an intergral part of this report. Will you please make additions and/or corrections on the encolsed copy and return it to us immediately in the enclosed self-addressed, stamped envelope. We appreciate your helpfulness. If you have further questions, please call us.

Sincerely yours,

Mayme R. Crowell
Research Assistant

Joanna Little
Research Assistant

MRC/JR:kdm
Enclosures

Letter to Respondents Who Requested Information

Oak Ridge Associated Universities

Post Office Box 117
Oak Ridge, Tennessee 37830
Telephone 615 483-8411

Manpower Education, Research and Training Division

Dear Colleague:

We appreciate your willingness to talk with us concerning your present and/or planned energy-related programs. Our project, "Energy Education Activities in Two-Year Education Institutions," one of the energy manpower projects we are conducting for the U.S. Department of Energy, has a two-fold purpose: to collect data from two-year postsecondary education institutions and to disseminate effectively information on energy activities to interested institutions.

You may have questions and concerns about energy-related programs and curricula that we are unable to answer until our data from all institutions is collected, aggregated, and analyzed. We are enclosing the materials you requested which we hope you will find useful. Your name has been included on our mailing list to receive a copy of the project report, although its printing and distribution will probably not be completed by the Education Programs Division of DOE until early 1979.

(Inserted here were paragraphs concerning specific information requests.)

If we can be of further assistance to you in developing your energy-related programs, please contact us.

Sincerely yours,

Ruth M. Gove, Joanna Little,
or Kathy Wells
Research Assistant

Mayme R. Crowell
Research Associate

MRC:ds
Enclosure(s)

APPENDIX C - CURRENT ENERGY-RELATED OCCUPATIONAL-TECHNICAL PROGRAMS BY ENERGY AREA

ENERGY AREA: COAL TECHNOLOGY

Boone County Vocational School
P. O. Box 50-B
Danville, West Virginia 25053
(304) 369-4585

Name of Program: Mine Mechanics (CETA)

Diploma/Certificate/Degree: Certificate
Date Program Began: 1975
Length of Program: 6 months
Present Enrollment: ≈ 20
Expected Graduates: ≈ 15
Total Program Graduates: ≈ 60-70
Number of Groups Trained: 6
Number of Graduates of Most Recent Group: ≈ 15

Purposes and Goals of Program

According to information received from the county vocational administrator, this program provides entry-level skill training in mine mechanics.

Program Topics

Based on information provided by the county vocational administrator, the main topics of study are (1) industrial electricity, (2) machine operation, (3) welding, and (4) hydraulics.

Comments

Information from the school's administrator indicates that the economy of Boone County depends largely on the mining industry, so there is a definite need for mining programs at the vocational school.

ENERGY AREA: COAL TECHNOLOGY

Boone County Vocational School
P. O. Box 50-B
Danville, West Virginia 25053
(304) 369-4585

Name of Program: Mining Technology

Diploma/Certificate/Degree: Certificate
Date Program Began: 1975
Length of Program: 1-3 years
Number of Groups Trained: 2
Number of Graduates of Most Recent Group: 80
Present Enrollment: ≈ 100
Expected Graduates: ≈ 50
Total Program Graduates: 140

Purposes and Goals of Program

According to information provided by the county vocational administrator, this program is a competency-based program, and students move through the program at their own pace, receiving certificates in the areas of specialty and training.

Program Topics

According to information related by a school administrator, the main areas of training are (1) hydraulics, (2) electricity, (3) welding, (4) applied mechanics, and (5) heavy equipment repair.

Comments

The school administrator indicates that 75 percent of school enrollment is in the mining programs, which serve about 1500 students.

ENERGY AREA: COAL TECHNOLOGY

Carver Career and Technical Education Center
4799 Midland Drive
Charleston, West Virginia 25306
(304) 925-1146

Name of Program: Mine Maintenance and Machine (CETA)

Diploma/Certificate/Degree: Certificate
Date Program Began: 1975
Length of Program: 6 months (1000 hrs.)
Number of Groups Trained: 7
Number of Graduates of Most Recent Group: ≈ 12
Present Enrollment: ≈ 12
Expected Graduates: ≈ 12
Total Program Graduates: ≈ 100

Purposes and Goals of Program

According to information received from a school administrator, this course is federally-funded through CETA and is designed to provide students with entry-level skills in the field of mine maintenance.

Program Topics

Information from the school indicates that the main topics of study are (1) electricity, (2) hydraulics, (3) machine operation, and (4) welding.

ENERGY AREA: COAL TECHNOLOGY

Hazard State Vocational-Technical School
101 Voc-Tech Drive
Hazard, Kentucky 41701
(606) 436-3101

Name of Program: Mining Maintenance Mechanic

Diploma/Certificate/Degree: Certificate
Date Program Began: 1963
Length of Program: 18 months
Present Enrollment: 45
Expected Graduates: ≈ 20
Total Program Graduates: 300
Number of Groups Trained: 15
Number of Graduates of Most Recent Group: ≈ 20

Purposes and Goals of Program

According to the school's brochure, this program prepares students to work on mining equipment.

Program Topics

The school brochure lists the following main program topics: (1) mining orientation, (2) related shop information, (3) oxy-acetylene welding and cutting, (4) diodes and rectifiers, (5) panel circuits, (6) mining law and safety, (7) basic hydraulics, (8) hydraulic repair, (9) use of tent equipment, (10) general maintenance and repair, and (11) learning laboratory.

Comments

Information from the school indicates that this program is designed to meet the growing demand for skilled technicians needed as the mining industry becomes more highly mechanized.

ENERGY AREA: COAL TECHNOLOGY

Madisonville Area Vocational-Technical School
P. O. Box 563
Madisonville, Kentucky 42431
(502) 821-7070

Name of Program: Mine Equipment Maintenance and Operations

Diploma/Certificate/Degree: Diploma
Date Program Began: 1973
Length of Program: 22 months (2640 hrs.)
Present Enrollment: 56
Expected Graduates: 15
Total Program Graduates: ≈ 146
Number of Groups Trained: *
Number of Graduates of Most Recent Group: 21

Purposes and Goals of Program

Information in the school brochure indicates that the mine maintenance student is trained to perform specific tasks on equipment in underground mining. The program is open-entrance/open-exit so that students may enroll in any one of the four components, complete it, and enroll in any of the others when they wish.

Program Topics

Based on information in the school brochure, the program consists of four courses, 660 hours each: (1) general mining and operations, (2) mechanics, (3) hydraulics, and (4) electrical.

Comments

The school administrator relates that the student receives a certificate for completing each of the four courses in the program and a diploma after completing the entire course.

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*The number was unobtainable since students graduate from courses at different times during the year,

ENERGY AREA: COAL TECHNOLOGY

Ralph R. Willis Vocational School
East Stratton Street
Logan, West Virginia 25601
(304) 752-4687

Name of Program: Mine Electricity

Diploma/Certificate/Degree: Certificate
Date Program Began: 1975
Length of Program: 30 weeks (1200 hrs.)
Present Enrollment: 0*
Expected Graduates: 0*
Total Program Graduates: 250

Number of Groups Trained: 10
Number of Graduates of Most Recent Group: 25

Purposes and Goals of Program

According to the school brochure this course is designed to help the coal miner develop enough knowledge and practical experience to pass the West Virginia Mine Electricity Examination.

Program Topics

A school administrator mentioned basic mine electricity and troubleshooting as the main areas of study in this program.

Comments

Information in the school brochure indicates that to enroll in this program, the candidate must be employed by a coal company and have at least 1 year's experience on the electrical force. The class combines 15 weeks' classroom theory with 15 weeks, on the job training.

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*At the present time, the coal companies have a sufficient number of certified mine electricians, but the program is available if and when the need arises.

ENERGY AREA: COAL TECHNOLOGY

Ralph R. Willis Vocational School
East Stratton Street
Logan, West Virginia 25601
(304) 752-4687

Name of Program: Mine Maintenance

Diploma/Certificate/Degree: Certificate
Date Program Began: 1972
Length of Program: 10 months (1200 hrs.)

Number of Groups Trained: 6
Number of Graduates of Most Recent Group: ≈ 20
Present Enrollment: ≈ 30
Expected Graduates: ≈ 20
Total Program Graduates: 132

Purposes and Goals of Program

According to information in the school brochure, the economy of Logan and surrounding counties in West Virginia depends on mining; therefore, the purpose of the mining programs at this vocational school is to fill the manpower needs of the mining industry in the area.

Program Topics

The school brochure lists the following topics as main areas of study: (1) general mining, (2) welding, (3) mine electricity, (4) hydraulics, (5) machine shop, (6) mine equipment rebuilding, and (7) machinery maintenance.

Comments

Information from the school indicates that Ralph R. Willis Vocational School serves 1200 to 1500 people in a variety of coal mining programs.

ENERGY AREA: COAL TECHNOLOGY

Ralph R. Willis Vocational School
East Stratton Street
Logan, West Virginia 25601
(304) 752-4687

Name of Program: Mine Maintenance (CETA)

Diploma/Certificate/Degree: Certificate
Date Program Began: 1974
Length of Program: 26 weeks (840 hrs.)
Number of Groups Trained: 6
Number of Graduates of Most Recent Group: 15-18
Present Enrollment: ≈ 20
Expected Graduates: ≈ 15
Total Program Graduates: 108

Purposes and Goals of Program

According to the information in the school's brochure, this course is designed to provide students with entry-level skills in the field of mine maintenance.

Program Topics

The school brochure lists the following seven program topics: (1) basic hydraulics, (2) welding, (3) mine electricity, (4) mechanical rebuilding, (5) electrical rebuilding, (6) blueprint and schematic reading, and (7) mine safety and first aid.

Comments

This class is offered under the guidelines established by the Comprehensive Employment Training Act.

ENERGY AREA: COAL TECHNOLOGY

Walker County State Technical College
P. O. Drawer L
Sumiton, Alabama 35148
(205) 648-3271

Name of Program: Coal Mine Technology

Diploma/Certificate/Degree: Certificate
Date Program Began: January 1975
Length of Program: 15 months
Number of Groups Trained: 3
Number of Graduates of Most Recent Group: 34
Present Enrollment: ≈ 160
Expected Graduates: ≈ 50-60
Total Program Graduates: 45*

Purposes and Goals of Program

Information from the school brochure indicates that the purpose of this program is to assist the coal mining industry by providing trained mining personnel. To achieve this, students are provided an opportunity to acquire facts, skills, habits, and attitudes for safe, competent, and economical operation of a coal mine.

Program Topics

The school brochure lists the following as the main areas of study: (1) orientation to underground mining, (2) mining methods, (3) safety, (4) mine ventilation, (5) basic and advanced mine electricity, (6) hydraulics, (7) oxy-acetylene burning, and (8) general arc welding.

Comments

Information from the school brochure relates that this program is the result of a cooperative effort of Walker State Technical College, the mining industry, and the United Mine Workers of America.

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*This number is due to students' being employed by the industry prior to completing the program.

ENERGY AREA: ENERGY CONSERVATION

Red Wing Area Vocational-Technical Institute
Highway 58 at Pioneer Road
Red Wing, Minnesota 55066
(612) 388-8271

Name of Program: Energy Management and Conservation Technology

Diploma/Certificate/Degree: Diploma
Date Program Began: 1977
Length of Program: 18 months (2183 hrs.)
Present Enrollment: ≈ 45
Expected Graduates: ≈ 40
Total Program Graduates: Unobtainable

Number of Groups Trained: First
Number of Graduates of Most Recent Group: Unobtainable

Purposes and Goals of Program

According to information in the school's brochure, the graduate of this program will be able to provide technical support to building contractors and engineers engaged in energy conservation and to aid them in planning new buildings and retrofitting requirements for existing structures.

Outline of Program Topics

The school brochure indicates that students are taught skills necessary to assess heating, ventilation, air conditioning, and lighting systems to ensure efficient energy consumption. Students are also taught monitoring and controlling of energy consumption through the use of instrumentation and computers.

Comments

According to the school's brochure, the energy programs are being offered through the developing Energy Education Center.

ENERGY AREA: ENERGY GENERATION AND TRANSMISSION

West Side Institute of Technology
9801 Walford Avenue
Cleveland, Ohio 44102
(216) 651-1656

Name of Program: Building Engineer

Diploma/Certificate/Degree: Certificate
Date Program Began: 1967
Length of Program: 12 months (1210 hrs.)
Present Enrollment: ≈ 26
Expected Graduates: ≈ 20
Total Program Graduates: ≈ 1000
Number of Groups Trained: ≈ 40
Number of Graduates of Most Recent Group: ≈ 20

Purposes and Goals of Program

Based on information provided in the school brochure, a graduate of this program can (1) obtain the engineer's license required to operate equipment essential to power generation, (2) control, adjust, or repair environmental control equipment required for industrial and institutional building maintenance, or (3) be employed as a serviceman for cooling and heating systems in residential and commercial applications.

Program Topics

The school brochure lists the following as the main topics of study: (1) basic electricity, (2) refrigeration operation and maintenance, (3) unitary gas and oil heating, (4) steam plant operation, (5) state license, history, requirements, and regulations, (6) boiler and cooling water quality control, (7) combustion control of oil, gas, and coal, (8) refrigeration, gas, oil and water piping, and valves and fittings, (9) industrial power distribution systems, and (10) industrial ventilation.

Comments

The school administrator attempted to clarify the above numbers by stating that the school enrolls approximately 30 students and graduates approximately 25 students each quarter. He stated this has become the standard procedure over the years.

ENERGY AREAS: ENERGY GENERATION AND TRANSMISSION, ENERGY CONSERVATION

West Side Institute of Technology
9801 Walford Avenue
Cleveland, Ohio 44102
(216) 651-1656

Name of Program: Environmental Technology

Diploma/Certificate/Degree: Associate Degree
Date Program Began: 1972
Length of Program: 18 months
Present Enrollment: ≈ 26
Expected Graduates: ≈ 20
Total Program Graduates: ≈ 600
Number of Groups Trained: ≈ 24
Number of Graduates of Most Recent Group: ≈ 20

Purposes and Goals of Program

Based on information in the school brochure, a graduate of this program can work in the fields of steam power generation, commercial and residential air conditioning, refrigeration, heating humidity, and pneumatic control. The graduate is also eligible to sit and take the Third Class stationary engineer license for the State of Ohio.

Program Topics

The school brochure lists the following courses in the program: (1) refrigeration technology, (2) steam technology, (3) technical mathematics, (4) boiler technology, (5) water chemistry, (6) general physics, (7) combustion technology, (8) heating technology, (9) numerical methods, (10) power plant equipment technology, (11) air conditioning technology, (12) technical writing, (13) mechanical drawing, (14) pneumatic control technology, (15) financial management, (16) communications, (17) social science, (18) basic economics, (19) speech, and (20) psychology.

Comments

The school administrator attempted to clarify the above numbers by stating that the school enrolls approximately 30 students and graduates approximately 25 students each quarter. He stated this has become the standard procedure over the years.

ENERGY AREA: NUCLEAR TECHNOLOGY

Capitol Radio Engineering Institute
3939 Wisconsin Avenue, N.W.
Washington, D. C. 20016
(202) 244-1600

Name of Program: Nuclear Engineering Technology

Diploma/Certificate/Degree: Diploma
Date Program Began: 1960
Length of Program: 21 months (825 hrs.)
Present Enrollment: ≈ 100
Expected Graduates: ≈ 14
Total Program Graduates: ≈ 200
Number of Groups Trained: *
Number of Graduates of Most Recent Group: *

Purposes and Goals of Program

According to the school's brochure, this is a complete program to allow electronics students to specialize exclusively for engineering technician careers in the nuclear field.

Program Topics

The school's brochure lists the following as the main topics of study: (1) introduction to nuclear engineering technology, (2) mathematics and calculus, (3) nuclear physics, (4) circuit theory, (5) reactor physics, (6) graphs and phasors, (7) inductance, (8) capacitance, (9) nuclear application of remote-control devices, (10) operator J, (11) resonance, (12) inductors and inductive coupling, (13) basic semiconductor physics, (14) semiconductor diodes, (15) electron tubes and amplifiers for nuclear applications, (16) pulse circuits for nuclear applications, (17) power supplies, (18) transistor operation and nuclear application, (19) solid-state device, (20) transistor biasing and stability, (21) oscilloscopes, (22) heat and thermodynamics, (23) reactor technology, (24) stability criteria for servomechanisms, (25) reactor control, and (26) health physics and instrumentation.

Comments

Information from the school indicates that this is a home-study course consisting of 55 assignments. To enter the program, the student must have previous experience or practical training in the use of electronic equipment, since the material is on an advanced level.

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*Students are not trained in groups.

ENERGY AREA: NUCLEAR TECHNOLOGY

Capitol Radio Engineering Institute
3939 Wisconsin Avenue, N.W.
Washington, D. C. 20016
(202) 244-1600

Name of Program: Nuclear Instrumentation and Control

Diploma/Certificate/Degree: Diploma
Date Program Began: 1968
Length of Program: 6 months (240 hrs.)
Present Enrollment: ≈ 150
Expected Graduates: ≈ 15
Total Program Graduates: ≈ 150

Number of Groups Trained: *
Number of Graduates of Most Recent Group: *

Purposes and Goals of Program

Information from the school's brochure indicates that this program constitutes a major elective available in the school's core electronics program. The nuclear instrumentation and control elective prepares students to work with the electronics equipment used in nuclear reactors.

Program Topics

The school brochure lists the following topics of study: (1) survey of nuclear engineering technology, (2) introduction to nuclear physics, (3) reactor physics, (4) heat and thermodynamics, (5) reactor technology, (6) reactor stability and control, (7) control principles and instrumentation, (8) nuclear applications of remote control devices, and (9) nuclear applications of transistors.

Comments

According to information received from the school, Capitol Radio Engineering Institute is a home-study school that offers a variety of programs in electronic engineering technology. It is desirable that the student have some experience and aptitude in electronics before enrolling in a program.

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*Students are not trained in groups.

ENERGY AREA: NUCLEAR TECHNOLOGY

Eastern Idaho Vocational-Technical School
2299 E. 17th Street
Idaho Falls, Idaho 83401
(208) 524-3000

Name of Program: Radiation Safety

Diploma/Certificate/Degree: Certificate
Date Program Began: ≈ 1970
Length of Program: 9 months

Number of Groups Trained: 7
Number of Graduates of Most Recent Group: 22
Present Enrollment: 25
Expected Graduates: 25
Total Program Graduates: 61

Purposes and Goals of Program

According to the school brochure, the radiation safety technology program provides basic training in safety required to work in the nuclear industry field.

Outline of Program Topics

The school brochure lists the following topics as main areas of study: (1) reactor technology, (2) SAFE considerations involved in reactor design construction, testing, operation, and maintenance service, (3) applying safety standards and practices, (4) impact of safety on people, equipment, facilities, and the environment, (5) training others in safe nuclear power practices, and (6) nuclear industry licensing program and practices.

Comments

Information from the school brochure indicates that Eastern Idaho Vocational-Technical School is located near the Idaho National Engineering Laboratory, and the graduates of this program are generally employed by INEL.

ENERGY AREA: NUCLEAR TECHNOLOGY

Wentworth Institute and College of Technology
550 Huntington Avenue
Boston, Massachusetts 02115
(617) 442-9010

Name of Program: Nuclear Engineering Technology

Diploma/Certificate/Degree: Degree
Date Program Began: 1961
Length of Program: 20 months
Present Enrollment: 0
Expected Graduates: 0
Total Program Graduates: 171
Number of Groups Trained: 16
Number of Graduates of Most Recent Group: 6

Purposes and Goals of Program

According to school officials, this program was designed to fill the employment needs of local industrial and utilities companies. Graduates fill positions of reactor operator trainees, radiation safety technicians, radiation instrument technicians, chemistry laboratory technicians, and control instrumentation technicians.

Program Topics

The Wentworth Institute catalogue lists the following courses: (1) algebra, trigonometry, and calculus, (2) physics, (3) English, (4) mechanical drafting, (5) computer programming, (6) electrical fundamentals, (7) electronics, (8) general chemistry, (9) welding, (10) electronic drafting, (11) social sciences, (12) nuclear instrumentation, (13) atomic and nuclear physics, (14) radioisotopes, (15) devices and controls, (16) reactor principles, (17) materials science, (18) thermodynamics, (19) health physics, and (19) physical chemistry.

Comments

The last class graduated in June 1978. Although local industrial and utility companies support the program and 1975 graduates had a starting salary of $15,000 per year, the program experiences difficulty in attracting students.

ENERGY AREA: PETROLEUM TECHNOLOGY

Liberal Area Vocational-Technical School
P. O. Box 1599
Liberal, Kansas 67901
(306) 624-2551

Name of Program: Industrial Electronics

Diploma/Certificate/Degree: Certificate
Date Program Began: 1968
Length of Program: 11 months
Present Enrollment: ≈ 30
Expected Graduates: ≈ 20
Total Program Graduates: Unobtainable
Number of Groups Trained: Unobtainable
Number of Graduates of Most Recent Group: ≈ 20

Purposes and Goals of Program

Based on information from the school, this program was developed specifically for the oil and gas industry at their request for trained personnel in instrumentation of measuring devices to monitor tanks and lines.

Program Topics

According to the instructor of the program, the following are some of the topics covered: (1) calibration procedures for link and lever measuring and recording devices, (2) Bourdon gauges, (3) measuring differential pressures, (4) temperature and temperature levels, (5) introduction to control systems, pressure, (6) use of deadweight testers as standards in calibration, (7) use of manometers as standards in calibration, (8) disassembly, reassembly, and calibration of differential pressure cells.

Comments

A school administrator relates that this is a highly-specialized program and graduates are very employable.

ENERGY AREA: PETROLEUM TECHNOLOGY

Seward Skills Center
Box 615
Seward, Alaska 99664
(907) 224-5246

Name of Program: Oil Utility Technician

Diploma/Certificate/Degree: Certificate
Date Program Began: March 1977
Length of Program: 6 months

Number of Groups Trained: 2
Number of Graduates of Most Recent Group: 28
Present Enrollment: ≈ 30
Expected Graduates: ≈ 25
Total Program Graduates: 48

Purposes and Goals of Program

According to the information from the school, this is a preparatory program designed to provide students with the theory and practical experience necessary for securing employment in any of the broad array of oil field jobs available.

Program Topics

The school brochure lists the following as the main topics of study: (1) introduction to oil exploration, (2) drilling, production, refining, marketing, and transportation, (3) chemical and physical properties of gas and oil, (4) industrial first aid and safety, (5) drilling rig components and occupations, (6) wellhead components and functions, (7) identification and function of surface and offshore oil equipment, (8) basic operation of earthmoving equipment, (9) pipe cutting and threading, and (10) basic carpentry and welding.

Comments

Approximately 75 percent of program graduates have been placed on jobs in training-related areas. This program is being expanded to 8 months beginning September 1978.

ENERGY AREA: PETROLEUM TECHNOLOGY

Sowela Technical Institute
501 Broad Street
Lake Charles, Louisiana 70601
(318) 433-1054

Name of Program: Instrumentation Technology

Diploma/Certificate/Degree: Diploma
Date Program Began: September 1976
Length of Program: 24 months

Number of Groups Trained: 1
Number of Graduates of Most Recent Group: 19
Present Enrollment: 36
Expected Graduates: 15-20 per year
Total Program Graduates: 19

Purposes and Goals of Program

A school administrator stated that program goals include the development of related knowledge and job skills in the installation, calibration, and repair of measuring instruments for such variables as temperature, flow, time, and pressure primarily in the petrochemical industry.

Program Topics

The school catalog lists the following topics: (1) direct current, (2) algebra, (3) alternating current, (4) trigonometry, (5) English, (6) physics, (7) transistors, (8) basic instruments, (9) blue-print reading, (10) temperature and pressure measurement, (11) industrial electronics, (12) liquid analysis and measurement, (13) gas analysis, (14) circuit analysis, (15) chemistry, (16) telemetering, (17) switching circuits, and (18) microwave.

ENERGY AREA: SOLAR TECHNOLOGY

Harbor Occupational Center
740 N. Pacific Avenue
San Pedro, California 90731
(213) 547-5551

Name of Program: Solar Energy Worker

Diploma/Certificate/Degree: Certificate
Date Program Began: January 1978
Length of Program: 5 months (400 hrs.)
Present Enrollment: 20
Expected Graduates: 20
Total Program Graduates: 20
Number of Groups Trained: 1
Number of Graduates of Most Recent Group: ≈ 20

Purposes and Goals of Program

According to information received from the school, this program is designed to train installers of solar energy equipment. The student is expected to correctly size, design, and install solar heating systems for home or commercial applications.

Program Topics

The school brochure lists the following as the main areas of study: (1) introduction to solar energy and the sun, (2) solar energy collection, (3) component parts, (4) operating modes, (5) controls, (6) equipment sizing and selection, (7) installation, (8) piping, (9) maintenance, and (10) troubleshooting.

Comments

Based on information provided by the principal of the school, this solar program operates in cooperation with a local water and power company and serves high school students as well as adults.

ENERGY AREA: SOLAR TECHNOLOGY

Red Wing Area Vocational-Technical Institute
Highway 58 at Pioneer Road
Red Wing, Minnesota 55066
(612) 388-8271

Name of Program: Air Conditioning, Heating, Refrigeration, and Related Solar Technology

Diploma/Certificate/Degree: Diploma
Date Program Began: 1973-74
Length of Program: 18 months (2184 hrs.)
Present Enrollment: 17
Expected Graduates: 17
Total Program Graduates: 75-80
Number of Groups Trained: 5
Number of Graduates of Most Recent Group: ≈ 75-80

Purposes and Goals of Program

The school's brochure states that "special emphasis will be on the installation and maintenance of solar energy collection systems as they apply to heating and cooling of buildings."

Program Topics

The brochure indicates that the solar technology courses are emphasized as a part of the regular air conditioning, heating, and refrigeration program.

APPENDIX D - PLANNED ENERGY-RELATED OCCUPATIONAL-TECHNICAL PROGRAMS BY ENERGY AREA

Jacksboro State Area Vocational-Technical School
Route 1
Jacksboro, Tennessee 37757
(515) 562-8648

Energy Area of Planned Program: Coal Technology

Proposed Beginning Date: Uncertain

Summary of Plans

Based on information from the school administrator, this will be a program in coal mining maintenance and mechanics. Graduates will receive a diploma for completing the 15-month program. Approximately 15 students are expected to enroll in the program.

Pennsylvania Institute of Technology
414 Sansom Street
Upper Darby, Pennsylvania 19082
(215) 352-7100

Energy Area of Planned Program: Coal Technology

Proposed Beginning Date: Spring 1979

Summary of Plans

A school administrator indicates that this program is an option available in the energy technology major that is scheduled to begin within 6 to 8 months. The graduate of this 18-month program will receive an associate degree.

Ouachita Vocational-Technical School
Vo-Tech Circle
Malvern, Arkansas 72104
(501) 332-3658

Energy Area of Planned Program: Energy Conservation

Proposed Beginning Date: September 1978

Summary of Plans

Information from the school indicates that a 1400-hour course in energy conservation will be offered in conjunction with the 2-year air conditioning/refrigeration course. Thirty-eight students have enrolled in the program, which includes such topics as (1) general instrumentation, (2) general load calculations, (3) building materials, (4) structures, (5) fuels, and (6) aspects of residential, commercial, and industrial energy conservation.

Harriman State Area Vocational-Technical School
Box 1025
Harriman, Tennessee 37748
(615) 882-6703

Energy Area of Planned Program: Energy Generation and Transmission

Proposed Beginning Date: September 1978

Summary of Plans

Based on information received from the school, this will be a 12-month diploma program to train boiler makers. Approximately 30 are expected to enroll. The instructional units included in the program are (1) welding, (2) burning, (3) math, (4) trigonometry, (5) measuring devices, (6) blueprint and sketching, (7) boiler theory, (8) miscellaneous boiler maker job tasks (nuclear construction, nuclear maintenance, fossil maintenance), and (9) flagging and rigging.

Red Wing Area Vocational-Technical Institute
Highway 58 at Pioneer Road
Red Wing, Minnesota 55066
(612) 388-8271

Energy Area of Planned Program: Energy Management

Proposed Beginning Date: September 1979

Summary of Plans

According to information in the school brochure, this will be an 18-month certificate program to train alternative energy information specialists. A graduate will be qualified as an information specialist and consultant with energy-related agencies. Employment might also be available in public relations activities associated with manufacturers of alternative energy systems and with energy suppliers.

Essex County Technical Career Center
91 W. Market Street
Newark, New Jersey 07103
(201) 622-1100

Energy Area of Planned Program: Laser Optics

Proposed Beginning Date: Uncertain

Summary of Plans

The curriculum outline for the laser electro-optics technology program indicates that the program is 1350 hours, or 9 months. The units of the basic course are (1) introduction to lasers, (2) geometrical optics, (3) light sources and wave optics, (4) laser projects, and (5) laser and electro-optics components. The advanced course contains the following units: (1) laser technology, (2) experimental optical methods, (3) laser/electro-optic devices, (4) laser applications, and (5) laser-electro measurements. This will be a certificate program with 40 people expected to enroll.

Sowela Technical Institute
501 Broad Street
Lake Charles, Louisiana 70601
(318) 433-1054

Energy Area of Planned Program: Petroleum Technology

Proposed Beginning Date: December 1978

Summary of Plans

According to information received from the school, the industrial mechanics program will train persons for plant maintenance work in the petrochemical industry. Blueprint reading, physics, mathematics, and equipment laboratories will be an integral part of the program.

Dakota County Area Vocational-Technical Institute
320 Third Street
Rosemount, Minnesota 55068
(612) 423-2281

Energy Area of Planned Program: Solar Technology

Proposed Beginning Date: Uncertain

Summary of Plans

According to information received from the school, this is a 6-month, 720-hour course to train solar energy installers. The program will be offered by the architectural department with two areas, drafting and application of solar panels to buildings, being stressed. The curriculum and plans have been developed in cooperation with a local industry who will employ graduates.

Delta Vocational-Technical School
P. O. Box 279
Hignway 63 West
Marked Tree, Arkansas 72365
(501) 358-2117

Energy Area of Planned Program: Solar Technology

Proposed Beginning Date: 1979-80 school year

Summary of Plans

A representative of the school indicated that plans are being developed for an 11-month certificate program with an estimated 20 students enrolling.

Essex County Technical Career Center
91 W. Market Street
Newark, New Jersey 07103
(201) 622-1100

Energy Area of Planned Program: Solar Technology

Planned Beginning Date: September 1978

Summary of Plans

Information from the school indicates that approximately 35 students have enrolled in the heating, ventilation, and air conditioning (HVAC) program that will include an additional 300-hour course in solar heating systems. Successful completion of the entire HVAC program leads to a solar endorsement on the original HVAC certificate. Main topics to be covered in the solar systems course are (1) introduction to solar systems, (2) solar collectors, (3) domestic hot water solar heating systems, (4) solar space heating systems, (5) solar system problem analysis, and (6) introduction to solar cooling systems.

Pennsylvania Institute of Technology
414 Sansom Street
Upper Darby, Pennsylvania 19082
(215) 352-7100

Energy Area of Planned Program: Solar Technology

Proposed Beginning Date: Spring 1979

Summary of Plans

According to information received from a school administrator, this program constitutes an option available through their planned energy technology major. The graduate of the 18-month program will receive an associate degree.

Pinellas Vocational-Technical Institute
6100 154th Avenue, North
Clearwater, Florida 22516
(813) 531-3531

Energy Area of Planned Program: Solar Technology

Proposed Beginning Date: September 1978

Summary of Plans

According to information related by the instructor of the program, this will be a 9-month program with 18 weeks spent on an introductory level and 18 weeks on an advanced level. A certificate will be awarded for successful completion of the program and 30 students are expected to enroll. Main topics of the course include (1) solar heating of air and water, (2) solar radiation, (3) heat loss and gain in buildings, (4) controls, and (5) economic feasibility of solar heating. The advanced courses offer more detail of the above, plus additional work in designing systems.

Red Wing Area Vocational-Technical Institute
Highway 58 at Pioneer Road
Red Wing, Minnesota 55066
(612) 388-8721

Energy Area of Planned Program: Solar Technology

Proposed Beginning Date: September 1978

Summary of Plans

The director of adult education indicated that this will be an 18-month certificate program offered through their developing Energy Education Center. Approximately 25 students are expected to enroll. Graduates can (1) design solar systems, (2) coordinate the installation of systems, (3) troubleshoot and service systems, (4) work with codes and standards, and (5) integrate solar and conventional systems.

Red Wing Area Vocational-Technical Institute
Highway 58 at Pioneer Road
Red Wing, Minnesota 55066
(612) 388-8271

Energy Area of Planned Program: Wind Power

Proposed Beginning Date: September 1979

Summary of Plans

The school brochure relates than an 18-month certificate program providing a comprehensive study of the systems designed to convert wind energy into a useful energy source is scheduled to begin in September 1979. Program activity will focus on the design, installation, maintenance, application, and sales of wind systems.

APPENDIX E - ENERGY-RELATED SHORT COURSES OFFERED BY ENERGY AREA

Short Courses Offered in Energy Conservation

State	School	Short Course Title and Participants	Type of Course*
Alabama	Muscle Shoals Technical Institute	Energy Conservation for Home Builders	2
Arkansas	Arkansas Valley Vocational-Technical School	Energy Conservation for Home Owners	4
	Ouachita Vocational-Technical School	Energy Conservation for the General Public	4
California	Garden Grove Adult Education	Energy Conservation for High School Students	4
	Petaluma Adult School	Awareness of Energy and Conservation for High School Students	4
Colorado	Larimer County Vocational-Technical Center	Energy Conservation for Buildng Trades Workers	2
Connecticut	Goodwin Regional Vocational-Technical School	Energy Conservation for Home Owners	4
		Energy Conservation for Building Trades Workers	2
Florida	Pinellas Vocational-Technical Institute	Energy Conservation for HOme Owners	4
Georgia	Albany Area Vocational-Technical School	Energy Conservation for School Maintenance Staff	2
		Energy Conservation for Memebers of the American Society of Heating and Air Conditioning Engineers	2
	Athens Area Vocational-Technical School	Energy Conservation for Industrial Plant Managers	2
Kansas	Wichita Area Vocational-Technical School	Energy Basics for the General Public	4
		House: The Shell, for the General Public	4
		Conserving Energy: Efficiency in the Home, for the General Public	4
		Environmental Control for the General Public	4
		Transportation for the General Public	4
		Energy Economics for the General Public	4
		Energy Conservation for Heating/Boiler Operators and School Maintenance Staff	2
		Energy Conservation for Heat Pump Specialists	2
		Duct Design and Fabrication for HVAC Workers	2

*Short courses are categorized as follows: (1) upgrading, (2) updating, (3) increasing employability, (4) increasing public knowledge, and (5) meeting union agreements and/or federal regulations.

Short Courses Offered in Energy Conservation (Cont'd)

State	School	Short Course Title and Participants	Type of Course*
Louisiana	Sabine Valley Vocational-Technical School	Energy Conservation for Industrial Plant Managers	2
Minnesota	Alexandria Area Vocational-Technical Institute	Minnesota Energy Code for Building Trades Workers	2
	Moorehead Area Vocational-Technical Institute	Minnesota Energy Code for Building Trades Workers	2
		Alternate Sources of Energy for Home Owners and Civic Groups	4
	916 Area Vocational-Technical Institute	Minnesota Energy Code for Building Trades Workers	2
	Red Wing Area Vocational-Technical Institute	Energy Conservation for Home Owners	4
		Energy Conservation for Building Trades Workers	2
	Rochester Area Vocational-Technical Institute	Energy Code; Retrofitting and Wood Burning for Building Trades Workers	2
	St. Paul Area Vocational-Technical Institute	Minnesota Energy Code for the Builidng Trades Workers	2
	Suburban Hennepin Area Vocational-Technical Institute	Minnesota Energy Code for the Building Trades Workers	2
New Jersey	Salem County Vocational-Technical School	Energy Audit of Your Home for Home Owners	4
New Mexico	Albuquerque Technical-Vocational Institute	Energy Conservation for Building Trades Workers	2
New York	Vocational Education and Extension Board	Energy Conservation for HVAC Workers	2
North Carolina	Technical Institute of Alamance	Energy Conservation for the General Public	4
Ohio	Lorain County Joint Vocational School	Ohio Edison Electric Compnay Seminar for Public Employees	2
	West Side Institute of Technology	Energy Seminar for Building Engineers and Plant Managers	2
Oklahoma	Indian Capitol Area Vocational-Technical School	Energy Conservation for HVAC Workers	2
	Mid-America Area Vocational-Technical School	Energy Conservation for HVAC Workers	2
	Western Oklahoma Area Vocational-Technical School	Energy Conservation for Business People and Teachers	2
South Carolina	Kershaw County Vocational Center	Energy Saving in the Home for Home Owners	4

*Short courses are categorized as follows: (1) upgrading, (2) updating, (3) increasing employability, (4) increasing public knowledge, and (5) meeting union agreements and/or federal regulations.

Short Coureses Offered in Energy Conservation (Cont'd)

State	School	Short Course Title and Participants	Type of Course*
South Dakota	Mitchell Area Vocational-Technical Center	Energy Control for School Custodians	2
Tennessee	Jackson State Area Vocational-Technical School	Motor and Thermostat Repair for Home Owners	4
Utah	Bridgerland Area Vocational Center	Energy Conservation for Building Trades Workers	2
West Virginia	Monongalia County Vocational Center	Energy Conservation for Home Owners	4

Short Courses Offered in Coal Technology

Alabama	Walker County State Technical College	Advanced Mine Electricity for Coal Miners	1
		Coal Safety Certification for Coal Miners	5
		Blasting for Coal Miners	5
		Initial Electrical Training for Coal Miners	1
		Electrical Retraining for Coal Miners	1
		Surface Mine Foreman for Miners	1
		Underground Mine Foreman for Miners	1
		Cardio-Pulmonary Respiration for Miners	5
Kentucky	Hazard State Vocational-Technical School	Mine Safety for Coal Miners	5
	Madisonville Area Vocational-Technical School	Safety for Coal Miners	5
Pennsylvania	Washington Institute of Technology	Preparation for Coal Mining for Unemployed Persons	3
West Virginia	Benjamin Franklin Career and Technical Education Center	Mine Safety for Coal Miners	5
	Boone County Vocational School	Mine Surveying and Mapping for Coal Miners	1
		Mine Foreman for Coal Miners	1
		Mine Bratticeman (CETA)	3
		Miner I (CETA)	3

*Short courses are categorized as follows: (1) upgrading, (2) updating, (3) increasing employability, (4) increasing public knowledge, and (5) meeting union agreements and/or federal regulations.

Short Courses Offered in Coal Technnology (Cont'd)

State	School	Short Course Title and Participants	Type of Course*
West Virginia	Boone County Vocational School	Mine Orientation for Underground Miners	5
		MIne Orientation for Surface Miners	5
	Carver Career and Technical Education Center	Mine Orientation for Surface Miners	5
		Mine Orientation for Underground Miners	5
	Logan County Vocational-Technical Center	Mine Foreman Certification Training for Coal Miners	1
		Miner I (CETA)	3
		Mine Safety for Coal Miners	5
	Vivian Mining Campus	Mine Bratticeman (CETA)	3
		Miner I (CETA)	3

Short Courses Offered in Energy Generation and Transmission

Alaska	Seward Skills Center	Power Energy Workshop for Alaskan Villagers	1
Minnesota	St. Paul Area Vocational-Technical Institute	Boiler Operator Licensing for High and Low Pressure Power Plant Operators	1
New Jersey	Burlington County Vocational-Technical School	Boiler Operator/Black Seal for Power Plant Operators	1
		Boiler Operator/Blue Seal for Power Plant Operators	1
		Boiler Operator/Red Seal for Power Plant Operators	1
		Boiler Operator/Gold Seal for Power Plant Operators	1
	Morris County Vocational-Technical School	Boiler Operator/Low Pressure/Black Seal for Power Plant Operators	1
		Boiler Operator/High Pressure/Black Seal for Power Plant Operators	1
		Boiler Operator/High Pressure/Blue Seal for Power Plant Operators	1
		Boiler Operator/High Pressure/Red Seal for Power Plant Operators	1

*Short courses are categorized as follows: (1) upgrading, (2) updating, (3) increasing employability, (4) increasing public knowledge, and (5) meeting union agreements and/or federal regulations.

Short Courses Offered in Energy Generation and Transmission (Cont'd)

State	School	Short Course Title and Participants	Type of Course*
New Jersey	Ocean County Vocational-Technical School	Boiler Operator/Low Pressure/Black Seal for Power Plant Operators	1
		Boiler Operator/Blue Seal for Power Plant Operators	1
	Passaic County Vocational School	Boiler Operator/Black Seal for Power Plant Operators	1
		Boiler Operator/Blue Seal for Power Plant Operators	1
	Salem County Vocational-Technical School	Boiler Operator/Black Seal for Power Plant Operators	1
		Boiler Operator/Blue Seal for Power Plant Operators	1
		Boiler Operator/Red/Gold Seal for Power Plant Operators	1
	Sussex County Vocational-Technical School	Boiler Operator/Low Pressure/Black Seal for Power Plant Operators	1
		Boiler Operator/High Pressure/Black Seal for Power Plant Operators	1
Pennsylvania	Technician Training School	Updating on Codes for Energy Generation and Transmission	2
Washington	Bates Vocational-Technical School	Boiler Operator License for Low Pressure/High Pressure Power Plant Operators	1

*Short courses are categorized as follows: (1) upgrading, (2) updating, (3) increasing employability, (4) increasing public knowledge, and (5) meeting union agreements and/or federal regulations.